

**HOLD QUEUE POSITION PUBLICATION**

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**CROSS-REFERENCE TO RELATED APPLICATIONS**

The present application is related to the following co-pending applications, incorporated herein by reference:

- 10 (1) U.S. Patent Application Serial No. \_\_\_\_/\_\_\_\_\_(Attorney  
Docket No. AUS920010944US1);
- 15 (2) U.S. Patent Application Serial No. \_\_\_\_/\_\_\_\_\_(Attorney  
Docket No. AUS920010946US1);
- 20 (3) U.S. Patent Application Serial No. \_\_\_\_/\_\_\_\_\_(Attorney  
Docket No. AUS920010947US1); and
- (4) U.S. Patent Application Serial No. \_\_\_\_/\_\_\_\_\_(Attorney  
Docket No. AUS920010948US1).
- PCT/US2019/033333  
PCT/US2019/033334  
PCT/US2019/033335  
PCT/US2019/033336

**BACKGROUND OF THE INVENTION****1. Technical Field:**

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The present invention relates in general to telecommunications and, in particular, to call hold queues. Still more particularly, the present invention relates to publishing call queue information to a caller in a caller specified format.

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**2. Description of the Related Art:**15  
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Many companies provide telephone-based access to help staff, sales personnel, representatives, and automated menus. Where high telephone call traffic is typical in telephone access to a company's representatives, a PBX system receives the call and distributes the call to an automatic call distributor (ACD). ACDs are often employed to provide an even and systematic distribution of incoming calls to multiple representatives. In particular, ACDs typically provide incoming calls with a direct connection to an available representative until all representatives are busy. Then, calling parties are placed in a call queue, and selectively connected to a representative once a representative comes available.

Call queues may cause frustration and ill will of consumers towards a company, particularly where excessively long waits, full queues and accidental disconnects are encountered. One way 30 to alleviate some of the frustration associated with call queues is by alerting callers to a current position within the call queue and an estimated hold time.

For example, a call queue system may inform callers waiting in a call hold queue of the expected waiting time through a voice announcement prior to connection to an attendant. While periodically informing callers via voice announcement of a queue position informs callers of progress within the call queue, callers only receive limited information as to an expected wait time.

Therefore, in view of the foregoing, it would be advantageous to provide a method, system, and program for publishing call queue information to each caller that will aid each caller in understanding the relative position of each caller within a call queue. Further, it would be advantageous to provide a method, system, and program for publishing call queue information in a format most practical and accessible to the caller.

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**SUMMARY OF THE INVENTION**

5 In view of the foregoing, it is therefore an object of the present invention to provide an improved telecommunications system.

10 It is another object of the present invention to provide a method, system and program for improved call hold queues.

15 It is yet another object of the present invention to provide a method, system and program for publishing call queue position information to a caller in a caller specified format.

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According to one aspect of the present invention, multiple characteristics of an on hold system are monitored. Then, responsive to a selection by a caller of a format for publishing the multiple characteristics, the multiple characteristics are transferred to the caller in the selected format.

20 According to another aspect of the present invention, multiple characteristics of an on hold system are monitored. Then, responsive to a selection by a caller of an interface for publishing the multiple characteristics, the multiple characteristics are transferred to the interface selected by the caller.

25 All objects, features, and advantages of the present invention will become apparent in the following detailed written description.

**BRIEF DESCRIPTION OF THE DRAWINGS**

The novel features believed characteristic of the invention are set forth in the appended claims. The invention itself however, as well as a preferred mode of use, further objects and advantages thereof, will best be understood by reference to the following detailed description of an illustrative embodiment when read in conjunction with the accompanying drawings, wherein:

10       **Figure 1** depicts a block diagram of a network call or contact center system in which the present invention may be implemented;

15       **Figure 2** illustrates a block diagram of an on hold system in accordance with the method, system, and program of the present invention;

20       **Figure 3** depicts an illustrative hold queue information menu transcript in accordance with the method, system, and program of the present invention;

25       **Figure 4** illustrates a graphical representation of a hold queue information publication in accordance with the method, system, and program of the present invention;

30       **Figure 5** depicts a high level logic flowchart of a process and program for controlling a PBX system within a call center in accordance with the method, system, and program of the present invention; and

35       **Figure 6** illustrates a high level logic flowchart of a process and program for controlling an on hold system in accordance with the method, system, and program of the present invention.

**DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

A method, system, and program for publishing call hold queue information to a caller in a caller specified format are provided. In particular, hold queue information may include real-time information about call hold times, current call duration times, current call queue positions, current number and identity of representatives available, and other information indicative of current call system activity. In addition, hold queue information may include estimations, such as estimated wait times, estimated time per call, estimated time per subject of call, and other time estimations calculated from current and past call system activity. Further, hold queue information may include historical information, such as average overall wait times, average call duration times, and other historical information reflective of past call system activity. Moreover, historical information may be specified for the caller, such as an individual caller's average wait times from past calls.

For purposes of the present invention, call hold queue information may be published to a caller in multiple formats, such that the interface that is preferred by a caller is utilized to output the call hold queue information. Output formats may include, but are not limited to, voice output, text output, graphical output, video output, and other output formats that are available. Interfaces may include, but are not limited to, wired telephones, wireless telephones, personal computers, pervasive computing devices configured with appropriate telephony software and Internet connectivity, and network servers. The term "publication" preferably encompasses voice, text, graphical, video and other output forms of call hold queue information.

In addition, for purposes of the present invention, a caller may designate the intended subject matter of call. The intended subject matter may be selected by the caller from a menu of designated subjects. In addition, the intended subject matter 5 may be provided by the caller in multiple formats including, but not limited to, voice, keypad, video, text, or other available formats.

In the following description, for the purposes of explanation, numerous specific details are set forth to provide a thorough understanding of the present invention. It will be apparent, however, to one skilled in the art that the present invention may be practiced without these specific details. In other instances, well-known structures and devices are shown in block diagram form to avoid unnecessarily obscuring the present invention.

The present invention may be executed in a variety of systems, including a variety of computing systems and electronic devices under a number of different operating systems. In one embodiment of the present invention, the on hold call queue system is a computer system that incorporates communication features that provide telephony, messaging, and information services to a plurality of callers. In general, the present 20 invention is preferably executed in a computer system that performs computing tasks such as manipulating data in storage 25 that is accessible to the computer system.

With reference now to the figures, and, in particular, with reference now to **Figure 1**, is an illustrative network call or contact center environment in which the present invention may be implemented. It will be appreciated by one with skill in the art 30 that although a particular network environment is described

below, the invention is not limited to use within the described network environment, rather, the inventive queue position advancement process may be implemented within any on-hold information service regardless of the telephony environment.

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As illustrated, multiple incoming calls are received at a call center **16**. In particular, a private branch exchange switch PBX **10** with automatic call distribution (ACD) ability receives incoming calls via trunk **23**, where trunk **23** is connected to a network of wireline, wireless, Internet Protocol (IP), and PSTN connections. In particular, PBX systems are well known in the art as switching systems designed to receive telephone calls destined for call center **16** and to queue those calls when a call handling agent is not available.

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PBX **10** distributes incoming calls to multiple representative terminals **18a-18n** via trunk **24**. In particular, PBX **10** receives incoming calls via trunk **23** from multiple terminals **8a-8n**, wherein terminals **8a-8n** may represent, but are not limited to, conventional wireline telephone systems, wireless phones, video phones, personal computers, pervasive computing devices configured with appropriate telephony software and Internet connectivity, telephone stations, other PBXs, or switching systems.

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In the description which follows, it will be assumed that all representative terminals **18a-18n** are busy and therefore PBX **10** cannot respond to an incoming call by making a direct connection to one of representative terminals **18a-18n**. As a result, PBX **10** is forced to place the incoming call on hold. In addition, PBX **10** determines the calling telephone number from caller ID or other methods.

After placing the incoming call on hold, the call and caller ID, time of call, and other information obtained by PBX **10** are forwarded to on hold system **12**. On hold system **12** preferably creates a record based on the call and positions the call within a call queue. While in the present embodiment PBX **10** forwards calls to a single on hold system, in alternate embodiments, PBX **10** may forward calls to multiple on hold systems. In addition, on hold system **12** and other on hold systems may be coupled to PBX **10** or may be remotely accessed by PBX **10**. Further, while in the present embodiment on hold system **12** is depicted as an independent system, on hold system **12** may also be incorporated within PBX **10**.

While the call is on hold, an interactive voice response unit (IVRU) **13**, coupled to PBX **10** and on hold system **12**, may offer the caller a menu of available options for receiving call hold queue information for on hold system **12**. In general, IVRU **13** is a voice information system which may be arranged to (i) prompt a caller for specific information by asking questions based on a set of modules in a transactions script, (ii) collect that information by detecting and interpreting dual tone multifrequency (DTMF) signals entered by the caller or by recognized speech input by the caller, (iii) organize the collected information in a specific format and (iv) forward the collected information to be utilized within on hold system **12**. For purposes of the present invention, prompts to the caller may be in voice, text, video, and/or graphical formats depending on the interface receiving the prompt. In addition, a voice browser may be utilized to output voice XML pages to a caller and monitor responses from the caller, as described in U.S. Patent Application No. \_\_\_\_ / \_\_\_\_ (Attorney Docket No. AUS920010946US1).

According to one advantage of the present invention, in offering the caller a menu of available options for receiving call hold queue information, the caller is offered the choice of 5 the interface at which to receive the call hold queue information from on hold system **12**. For example, the caller may select to receive the call hold queue information in a voice format as provided by IVRU **13**. The voice format may be supported, for example, by a telephone or a personal computer with speakers for 10 supporting the voice format. In another example, the caller may select to receive the call hold queue information in a text format at a digital text supporting device. In yet another example, the caller may select to receive the call hold queue information in a graphical format via a web page. Further, the caller may select to receive the call hold queue information at a 15 network address, as an e-mail or instant message.

In order to achieve the advantage of the present invention, on hold system **12** may publish call hold queue information to multiple interfaces. In particular, on hold system **12** may 20 publish call hold queue information to terminals **8a-8n**, such that the caller receives the call hold queue information in a voice or text format at the device utilized to place the call. In addition, as will be further described, via a network **19**, on hold 25 system **12** may publish call hold queue information to caller accessible interfaces **14a-14n**, which are independent of the device utilized by the caller to place the call. Further, on hold system **12** may publish call hold queue information to a 30 network server **15** via network **19** according to a network identifier for a particular caller, where the caller may access the published call hold queue information in the form of an e-

mail or instant message at a computing system where the caller is logged into network server under the network identifier.

5 Referring now to **Figure 2**, is an illustrative block diagram of an on hold system in accordance with the method, system, and program of the present invention. As illustrated, on hold system 12 includes a controller 30, a call hold queue 32, hold queue information database 33, a network interface 34, and a data storage system 38 communicatively connected via a bus 36.

10 Additional systems may be connected along bus 36 that are not depicted herein. In particular, controller 30 comprises conventional computer resources including, but are not limited to, at least one processor, memory, a data storage system, system software and application software, that function together to perform the functions described with reference to controller 30.

15 Network interface 34 preferably communicates with PBX 10, 20 caller accessible systems and terminals via a telephone network or other networking system. In particular, network interface 34 receives transfers of calls from PBX 10 and then returns calls to PBX 10 when a call is the next in line within call hold queue 32.

25 Hold queue information database 33 is preferably coupled to call hold queue 32 to maintain characteristics of on hold system 12. In particular, hold queue information database 33 includes information about the current status of call hold queue 32. In 30 addition, controller 30 preferably monitors past and current call queue activity in order to make wait time estimates. Wait time estimates are updated in hold queue information database 33.

Moreover, data storage system **38** includes a hold queue history database **39** and an individual caller history database **40** from which controller **30** calculates historical averages for call hold queue **32** in general and historical averages for a particular caller or group of callers. Average wait times are then updated in hold queue information database **33**.  
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In particular, when a call is received at on hold system **12**, a call tracking number is assigned the call with placement in call hold queue **32**. The call may be further identified for historical storage purposes by the caller ID of the terminal from 10 which a call is made.

In the present invention, while a call is holding within call hold queue **32**, the caller is preferably prompted to select 15 from multiple options by IVRU **13**. Particular to the present invention, options may include requesting a publication of the call hold queue information and updating the subject of the call in the call hold queue information. In addition, other options 20 may be provided to a user including musical selections, news selections, third-party lines, and other call hold options that are known in the art.

If a caller requests a publication of the call hold queue 25 information, then the caller is next prompted to indicate the method by which the caller would like to receive the publication. In particular, the method of receiving the publication may include both the format in which the publication is received and the interface at which the publication is received.  
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If the caller prefers to receive a voice or text publication of the call hold queue information at a terminal, then IVRU **13**

initiates output of hold queue information database **33** in the requested format to the caller's terminal.

However, if the caller prefers to receive a voice, text, or graphical publication of the call hold queue information at a caller accessible interface, then IVRU **13** provides output of the call tracking number and a web or other network address for the caller to access. To access the call hold queue information, the caller utilizes a caller accessible interface, such as a personal computer system with a network connection, to access a web or other network page at the address and enters the call tracking number. In particular, on hold system **12** may function as a server location for the network address. Alternatively, on hold system **12** may be coupled to an additional server system that serves as the location for the network address and manages web related functions.

In response to receiving a call tracking number entered via the web page, controller **30** verifies the call tracking number and controls publication of the contents of hold queue information database **33** to the call accessible interface from which the caller entered the call tracking number.

Further, if the caller prefers to receive an e-mail or instant message of the call hold queue information that the caller may then access at a caller accessible system or other computing system with network connectivity, then IVRU **13** requests a network identifier of either an e-mail address or instant messaging identifier. In particular, a single identifier may be utilized to represent an e-mail address and instant messaging identifier, such that if the caller is currently logged onto a network system supporting the network identifier, then the call hold queue information is transmitted as an instant message; if

the caller is not logged onto the network system, then the call hold queue information is stored as an e-mail.

According to another advantage of the present invention, a caller may designate publication preferences that are stored in individual call history database **90** or an alternate universal storage system. Publication preferences are preferably stored according to at least one caller ID and accessed when a caller ID is detected with an incoming call.

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In particular, publication preferences may designate the types of information from hold queue information database **33** that the caller prefers. In addition, a caller may indicate a preference for the interface and format in which hold queue information should be published to the caller. Further, where the caller is receiving the information via a web page or other graphical format, the caller may designate graphical preferences for publication.

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According to another advantage of the present invention, each caller may indicate the anticipated subject matter of the call, where the anticipated subject matter for each call is stored in hold queue information database **33**. In particular, the caller may select the subject matter of the call in order to determine which of multiple call queues a call should be positioned within. In addition, if necessary, a caller may further select to update the anticipated subject matter of the call while on hold. Updating a subject matter may adjust which call queue a call is held within.

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With reference now to **Figure 3**, is an illustrative hold queue information menu transcript in accordance with the method, system, and program of the present invention. As illustrated, a

transcript **50** includes textual promptings and responses to selections. According to one embodiment of the present invention, transcript **50** is stored in a on hold system and utilized by an IVRU for interaction with a caller.

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First, the caller is prompted to receive a publication of hold queue information by pressing or entering "1". If the caller selects to receive a publication, then the caller is prompted to select the output format and interface for publication. The information to be published to the caller follows and may be output by voice, text, graphics, or video.

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Second, the caller is prompted to log the subject matter of the call by pressing or entering "2". If the caller selects to log the subject matter of the call, then the caller is prompted to select from among multiple pre-defined subject matter.

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Referring now to **Figure 4**, is a graphical representation of a hold queue information publication in accordance with the method, system, and program of the present invention. As illustrated, a display interface **60** displays a hold queue information publication **62**, in response to entry of a current call tracking number.

In the present example, the caller has specified a preference for the categories of "queue position", "call duration", "time with representative", "representative", and "subject matter" to be displayed. In alternate embodiments, other callers may specify alternate categories to be displayed within hold queue information publication **62**. In addition, in alternate embodiments, other callers may specify alternate graphical formats for display of hold queue information publication **62**.

In addition, display interface **60** includes a selectable button **64** where, in response to selection of selectable button **64**, a caller is prompted with types of subject matter to assign to a call.

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With reference now to **Figure 5**, depicts a high level logic flowchart of a process and program for controlling a PBX system within a call center in accordance with the method, system, and program of the present invention. As illustrated, the process starts at block **70** and thereafter proceeds to block **72**.

Block **72** depicts a determination as to whether a new call is received. If a new call is received, then the process passes to block **78**. If a new call is not received, then the process passes to block **74**. Block **74** illustrates a determination as to whether or not a call processing request is received. When a call is at the top of the call queue, the call is preferably transferred back to the PBX with a call processing request. If a call processing request is not received, then the process passes to block **72**. If a call process request is received, then the call is transferred to the next available representative, as depicted at block **74**, and the process ends.

Block **78** illustrates a determination as to whether or not a representative is available. If a representative is available, then the call is transferred to the next available representative, as illustrated at block **80**, and the process ends. If a representative is not available, then the process passes to block **82**. Block **82** depicts identifying the caller ID associated with the call. Next, block **84** illustrates distributing the call to the on hold system, and the process ends.

Referring now to **Figure 6**, illustrates a high level logic flowchart of a process and program for controlling an on hold system in accordance with the method, system, and program of the present invention. As depicted, the process starts at block **90** and thereafter proceeds to block **92**.

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Block **92** illustrates a determination as to the event that occurred when an event occurs. If a new call is received, then the process passes to block **92**. If a call tracking number is received from a caller accessible interface, then the process passes to block **114**.

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Block **94** depicts placing the call in the call queue. In placing the call in the call queue, a record of the call is placed in the call hold queue information database in association with a call tracking number and any history associated with a caller according to the caller ID of the call. Next, block **96** illustrates initiating play of the queue information menu transcript to the caller, and the process passes to block **98**.

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Block **98** illustrates a determination as to whether a caller selects to enter subject matter. If a caller selects to enter subject matter, then the subject matter for the caller is updated in the hold queue information database, as depicted at block **100**, and the process passes to block **96**. If a caller does not select to enter subject matter, then the process passes to block **102**.

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Block **102** depicts a determination as to whether a caller selects to receive a publication of hold queue information. If the caller does not select to receive a publication of hold queue information, then the process passes to block **78**. If a new call is received, then the process passes to block **78**. If the caller

does select to receive a publication of hold queue information, then the process passes to block **104**.

5 Block **104** illustrates prompting the caller to select a preferred format and interface for receiving the publication of hold queue information. Next, block **106** depicts a determination as to the interface selected.

10 If a terminal is selected, then the hold queue information is transferred, in the selected format, filtered according to any caller output preferences, to the caller terminal, as illustrated at block **108**.

15 If a caller accessible interface is selected, then the call tracking number for the call and the network address for the call service are output to the caller via voice or text, as depicted at block **110**.

20 If a network identifier is selected, then the hold queue information is transferred, filtered according to any caller output preferences, to a network server according to the network identifier. In particular, the network identifier may include an electronic mail (e-mail) address or instant messaging address.

25 Following the steps depicted at blocks **108**, **110**, and **111**, block **112** illustrates playing additional options to the caller, and the process ends.

30 Returning to block **114**, a determination is made as to whether a call tracking number is current. If the call tracking number is not current, then the process ends. If a call tracking number is current, then the process passes to block **116**. Block

**116** illustrates specifying the hold queue information for the call tracking number according to caller output preferences. Next, block **118** depicts transferring the specified hold queue information to the requesting caller accessible interface, and

5 the process ends.

It is important to note that while the present invention has been described in the context of a fully functioning data processing system, those of ordinary skill in the art will appreciate that the processes of the present invention are capable of being distributed in the form of a computer readable medium of instructions and a variety of forms and that the present invention applies equally regardless of the particular type of signal bearing media actually used to carry out the distribution. Examples of computer readable media include recordable-type media, such as a floppy disk, a hard disk drive, a RAM, CD-ROMs, DVD-ROMs, and transmission-type media, such as digital and analog communications links, wired or wireless communications links using transmission forms, such as, for example, radio frequency and light wave transmissions. The computer readable media may take the form of coded formats that are decoded for actual use in a particular data processing system.

25 While the invention has been particularly shown and described with reference to a preferred embodiment, it will be understood by those skilled in the art that various changes in form and detail may be made therein without departing from the spirit and scope of the invention.

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